

The Food and Fiber System: Contributing to the U.S. and World Economies. By Kathryn L. Lipton, Office of the Administrator; William Edmondson, Food and Rural Economics Division; and Alden Manchester, Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture. Agriculture Information Bulletin No. 742.

Abstract

Even though farming accounts for only about 1 percent of the total national workforce, it is at the core of the food and fiber system. The system is one of the largest sectors in the U.S. economy, and is comprised of industries related to farming, including feed, seed, fertilizer, machinery, food processing, manufacturing, and exporting. The interrelationships among the sectors of the food and fiber system and the U.S. and world economies are many and complex. As a result, U.S. and world policies and economic factors—such as interest and inflation rates—play a critical role in everything from the cost and availability of farm credit to the demand for farm products at home and abroad. The farm crisis of the 1980's illustrates how specific economic events can impact the food and fiber system. In addition, long-term changes in the system have occurred in response to shifts in consumer incomes, demographics, lifestyles, and perceptions of health and diet.

Keywords: farming, food and fiber system, industries, gross domestic product, income, employment, input/output analysis, agricultural trade, rural economy.

Note: Use of brand or firm names in this publication does not imply endorsement by the U.S. Department of Agriculture.

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Summary

The U.S. food and fiber system (farming and its related industries) accounted for \$997.7 billion (13.1 percent) of the gross domestic product (GDP) in 1996 and employed almost 23 million people (17 percent of the U.S. labor force). Although farming employs only about 1 percent of the U.S. workforce and accounts for less than 1 percent of GDP, its effect on the national economy is much larger because of its links to a variety of industries. Farmers, for example, require machinery, fertilizer, seed, feed, labor, financial services, and other inputs to produce crops and livestock. Economic activity by the industries that supply farmers and marketers with inputs accounted for 3.9 percent of GDP in 1996.

Farmers, in turn, sell their products to the sectors that store, process, transport, manufacture, distribute, export, or retail farm products. These hundreds of industries (including, for example, grain elevators, flour/textile mills, and canneries) accounted for another 8.3 percent of GDP in 1996. The food and fiber system is among the largest users of real estate and rental services, and transportation/warehouse services. In 1996, American consumers spent about \$22.3 billion, or 4 percent of their food dollar, for transportation.

Farmers use energy both directly (to run equipment on the farm) and indirectly (as energy consumed off the farm for manufacturing fertilizers and pesticides, for example). Since 1978, total energy use by the agricultural sector has fallen almost 25 percent, largely because farmers have become more energy-efficient in response to rapidly rising fuel prices in the early 1980's.

With comparative advantage in many products, the United States is the world's top exporter of agricultural products. U.S. exports totaled \$60.4 billion in 1996. Over 30 percent of U.S. crop acreage can be considered as producing for export. The agricultural trade surplus in 1996 stood at \$26.8 billion, while the nonagricultural trade account was in deficit by \$235.1 billion. U.S. agriculture's narrowing of the trade gap helps strengthen the American dollar, which reduces the prices of imported goods and helps lower the inflation rate.

Each dollar earned from agricultural exports stimulates another \$1.32 of output in the U.S. economy. Thus, the \$60.4 billion worth of exports in 1996 generated an estimated additional \$79.5 billion in supporting activities required to produce and transport products for export.

The composition of U.S. agricultural exports has changed in the past several decades. In the 1960's and 1970's, food grains, feed crops, and oil crops formed the bulk of U.S. agricultural exports. The value of U.S. high-value exports—such as meat products, fruits and vegetables, and beer and wine—has increased more than 100 percent since the mid-1980's. In 1996, high-value products accounted for almost 55 percent of U.S. agricultural exports.

As the level and product mix of agricultural exports has changed, so have the number and type of related industries involved. Low-value, bulk products generally involve relatively little economic activity outside of agriculture. In contrast, high-value products require more handling and processing beyond the farm gate. USDA estimates that each \$1.00 of high-value exports stimulated another \$1.70 in indirect and supporting activities in 1996, compared with \$0.85 from bulk commodities.

Many factors within and outside the food and fiber system, including demographics, energy costs, and the interest and inflation rates, play a critical role in everything from the cost and availability of credit to the demand for food products at home and abroad. The farm crisis of the 1980's, for example, illustrates how specific economic events can impact the food and fiber system.

In addition, changing incomes, lifestyles, and consumer perceptions of health and diet relationships have created significant changes in the food system over the past several decades. For example, about three-fourths of women aged 25 to 54 are now in the workforce, so convenience is at a premium as consumers now spend an average of 20-30 minutes preparing a typical meal. With more money and less time, Americans are buying, preparing, and consuming many products that combine more services (such as processing and preprepared) with basic foods. In addition, with rising incomes and more two-earner households, Americans eat out more often. Foodservice accounted for 46 percent of all food dollars in 1996, compared with 25 percent in 1954.

And while consumers do not want to spend a lot of time on food preparation, they also are not willing to scrimp on health and nutrition. Consumer concerns about food additives, chemicals, and preservatives have translated into a growing market for products with improved health and safety attributes. Marketers have responded by introducing pesticide-free products and organic produce. There has also been a growing market for animal-product alternatives, such as vegetarian burgers, soy and rice milk, cheese alternatives, and nondairy dessert products that did not exist 40 years ago.

To produce specialized, culture-specific products, firms must often procure specialized farm products. To do this, processors have increasingly turned to contracting with growers or vertical integration. Production contracts and ownership integration have increased from 12.7 percent of total farm output in 1960 to 21 percent in 1993-94. Almost all chickens are now raised under direct contracts between growers and food companies. The practice is also common in the hog and vegetable industries. Contract production and vertical integration result in constant supplies, particular quality characteristics, and relatively stable raw commodity prices.

The Food and Fiber System

Contributing to the U.S. and World Economies

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Introduction

Farming employs only about 1 percent of the U.S. workforce and accounts for less than 1 percent of gross domestic product (GDP). However, it remains important to the national economy because of its links to a variety of industries, including feed, seed, fertilizer, machinery, food processing, manufacturing, and exporting. In 1996, farming and related industries—referred to here as the food and fiber system—contributed \$997.7 billion, over 13 percent of GDP, and employed almost 23 million people or 17 percent of the U.S. labor force (table 1, p. 6).

This report examines the links among the farm, national and international economies, and the food and fiber sector to provide an understanding of how economic policies and conditions, global business cycles, and world events affect the farm sector and the food and fiber system. Because income and employment are generated in the national economy as products move through the food and fiber system, input/output analysis was used to estimate the direct and indirect links. The 524-sector Economic Research Service model was also used to measure the effects of agricultural exports on the Nation's economy, including rural employment. The model provides a "snapshot" of the linkages between the agricultural, domestic, and world economies at a particular point in time, while discussions in this report of historical events and current and future trends give a perspective on the dynamics of the linkages.

To understand the complexity of the food and fiber system, imagine farming as the center of an interrelated web of industries spreading throughout the economy. Moving out from the farm, producers buy

inputs—seeds, fertilizer, and equipment—from agricultural dealers and suppliers. Those suppliers, in turn, purchase from manufacturers who rely on the steel and energy industries, for example.

Even farther out in the web, mining provides the raw materials for fertilizer or steel production. Beyond the farm gate, processors turn wheat into bread or corn into ethanol. These processors also rely on a variety of industries to provide everything from the processing equipment to cardboard containers. Throughout the food and fiber system, labor, energy, financial services, and transportation are necessary to produce crops, process food, finance capital and equipment, and haul product to market. Even the Government provides resources—grazing land and irrigation water—and services like marketing information and food safety inspections.

Because the food and fiber system is comprised of a myriad of diverse yet interrelated industries, it is inextricably linked to the national and international economies. Trade and financial links mean that domestic and foreign economic policies affect U.S. agricultural exports and the food and fiber system. Since U.S. farm and food exports depend so much on economic conditions abroad, global business cycles—which are closely tied to U.S. economic conditions—affect the demand for U.S. farm products. Interest rates, which can be a significant production expense, are set by conditions in national and international financial markets and are strongly influenced by national economic policies.

Major economic shocks, such as an energy crisis or changes in interest rates, can significantly affect the food and fiber industries. Prime examples include the oil shortages and price increases of 1974, 1979,

and 1990, and the runup in real interest rates (interest rates higher than inflation) in the early 1980's.

Rising energy prices, for example, mean increased input costs for farmers. Historically, each 1-percent increase in the U.S. price of imported crude oil has translated into a 0.7-percent rise in the farm price of gasoline and diesel fuel (12).¹ However, higher energy costs also mean increased prices for fertilizers and chemicals. Higher energy costs, along with increased research and development costs and increasing regulatory requirements, contributed to a 238-percent increase in pesticide prices during 1966-86 (7). Pesticide prices have continued to trend upward, increasing 2-5 percent annually from 1991 to 1995 (27).

Pesticide use declined between 1982 and 1990 as commodity prices fell and large amounts of land were taken out of production by Federal programs. Since 1990, total quantities of pesticides have generally increased, but continue to fluctuate with changes in planted acreage, infestation levels, adoption of new products, and other factors (27).

Because much of the needed capital is financed, the food and fiber system is increasingly affected by developments in the general economy that determine the availability of loan funds and the level of interest rates. Greater use of borrowed capital, higher land prices, larger mortgages, and higher interest rates have increased farm interest expenses. Interest payments (on short-term debt for input purchases and long-term real estate loans) now account for approximately 7 percent of farm production expenses, compared with 3 percent in 1950 and nearly 16 percent at their peak in 1982 (32).

Farming Is Linked to Many Industries

Farming is linked to a myriad of industries required to grow, process, and sell farm products. Farmers, for example, require machinery, fertilizer, seed, feed, labor, financial services, and other inputs to produce crops and livestock. Economic activity by the industries that supply farmers and marketers with inputs accounted for 3.9 percent of GDP in 1996. Farmers,

in turn, sell their products to the sectors that store, process, transport, manufacture, distribute, export, or retail farm products. These hundreds of industries accounted for another 8.3 percent of GDP in 1996.

Today's farming technology calls for a large and continual flow of materials and services purchased off the farm. In 1996, farmers purchased approximately \$49 billion of inputs originating in the farm sector, and an estimated \$130 billion worth of goods and services from the nonfarm sectors of the economy.

Farmers, of course, are the major customers for industries providing specialized goods and services to the farm sector. For example, an estimated 58 percent of the farm machinery industry's output was purchased by U.S. farmers in 1995 (the latest year data are available) and the remainder exported. Farmers purchased 80 percent of the nitrogenous fertilizers and 40 percent of the phosphate fertilizers produced in the United States.

Farmers are among the largest users of real estate and rental services, and transportation and warehouse services. Farmers use energy both directly and indirectly to produce food. Direct energy is used on farms to run equipment and indirect energy is consumed off the farm for manufacturing fertilizers and pesticides. Since 1978, total energy use by the agricultural sector has fallen almost 25 percent, largely because farmers have become more energy-efficient in response to rapidly rising fuel prices in the early 1980's (12).

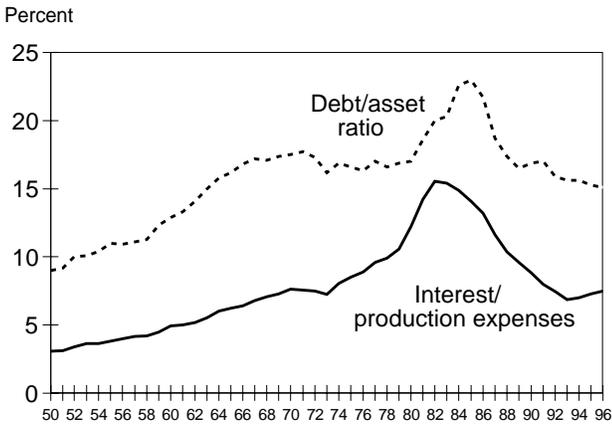
Manufacturing and applying fertilizers and pesticides accounted for 51 percent of the total energy used in agriculture in 1992, up from 26 percent of total use in 1965. Total energy use associated with fertilizers and pesticides doubled between 1965 and 1992. Farm energy expenditures on gasoline, diesel fuel, LP gas, electricity, and lubricants totaled \$8.93 billion or about 5 percent of total farm production expenses in 1996 (12).

Because farming requires substantial capital investments in machinery and equipment, the availability and use of credit is necessary for the operation of most farm enterprises. Farmers' total debt was 15 percent of assets in 1996, compared with 9 percent in 1950 (fig. 1). Debt as a share of assets peaked in 1985 at 23 percent (32). Commercial banks held almost 40 percent of the \$156.5 billion in total farm

¹ Numbers in parentheses refer to References.

Figure 1

Measures of farm debt and interest burden, 1950-96



Source: (31, 32).

debt in 1996; the Farm Credit System, made up of government-sponsored enterprises, accounted for an additional 25 percent of farm debt.

Many Supporting Industries From Farm to Retail

Many types of firms are needed to move food and fiber products from the farm to their intermediate and final uses. These include industries that store and process farm products, such as elevators, packing sheds, flour and textile mills, canneries, and food processing plants. Other supporting industries are also part of the food and fiber system, including local buyers, assemblers, auction markets, truck lines, railroads, airfreight companies, commission houses, brokers, organized exchanges, credit institutions, packing plants, wholesalers, exporters, factory sales representatives, supermarkets, convenience stores, fast-food outlets, drugstores, and restaurants (36).

Corn provides just one example of the post-farm links in marketing a single farm commodity (fig. 2). U.S. corn production may be fed to livestock and poultry on the farms where it is raised, or enter the marketing system to be exported, processed into feed, or used for a variety of food and industrial products (14). Corn moving off the farm is taken to country elevators, the primary assembly point, or subterminal or terminal elevators. Country elevators and subterminal

elevators are generally located near production areas, providing a source of employment for rural residents.

Terminal elevators, in contrast, are not necessarily located near production areas, making rail transportation an important supporting industry (14). From these central distribution points, corn can be stored as off-farm stocks; moved to any one of several types of feed, food, or industrial processors; or transported to port terminal elevators for export. Processing may be as simple as cleaning and packaging fresh produce or it may involve numerous complex mechanical and chemical processes for products like corn syrup and corn oil.

These products, in turn, may be used as inputs in subsequent manufacturing or processing. Corn meal, for example, can be both a final product or an intermediate input used in the production of other baked goods. High-fructose corn syrup, a critical ingredient in soft drink manufacturing, is a product of corn wet-milling. Corn starch also is used as a thickener in many prepared foods. About 33 million bushels of corn were used for corn starch for food uses in 1995/96, compared with 187 million bushels for industrial uses of corn starch (33).

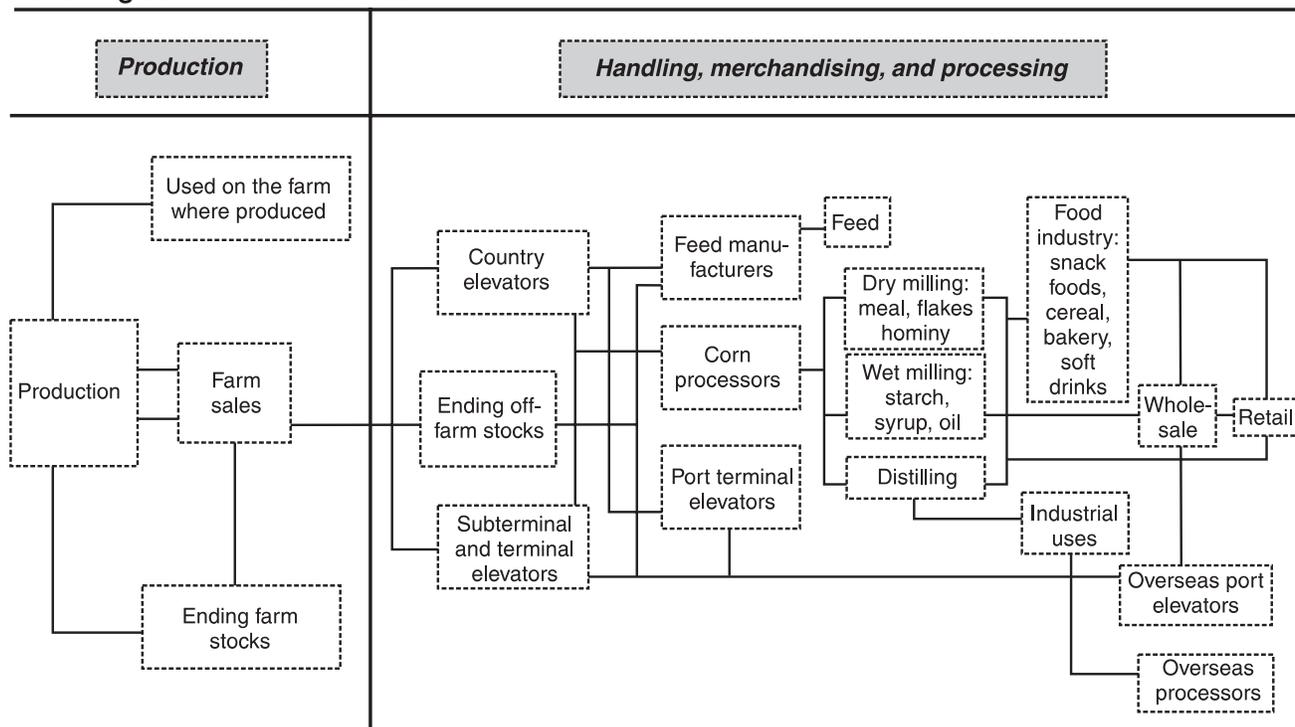
Corn starch is used by the paper industry as a coating on paper and by the construction material industry as a component in the manufacture of wallboard. In 1995, approximately 60 percent of the 4 billion pounds of natural adhesives produced and consumed in the United States were derived from starch, primarily corn and wheat starch. These 2.4 billion pounds of starch required roughly 73 million bushels of corn equivalent (33).

Approximately 400 million bushels of corn (5 percent of the corn crop) were used to produce ethanol in 1995/96. Fuel alcohol is also made from the starch component of corn kernels and blended with gasoline for use as a fuel. Ethanol-blended fuels account for about 10 percent of the transportation fuel market.

In most cases, processed products move through the wholesaling and retailing industries to the consumer. Wholesalers buy in volume from processors and distribute smaller quantities to grocery stores, restaurants, and other firms servicing businesses and consumers. Transportation services move products

Figure 2

Following corn from farm to retail



Source: (14, 16)

through each marketing stage. In 1996, American consumers spent about \$22.3 billion, or 4 percent of their food dollar, for transportation (8). Trucks and railroads are the primary movers of fresh produce and processed foods, while rails and barges are the major transporters of grain and other bulk agricultural commodities.

Retailers represent the final stage in the marketing chain from farmer to end user. In 1995, there were almost 190,000 grocery stores, supermarkets, and other retail food stores, with sales of \$410.5 billion (10). Sales in foodservice establishments totaled \$310 billion in 1995 (10).

Several types of business agents help make the marketing system orderly and efficient. The retailer, for example, buys products for resale directly to the consumer. Wholesalers sell to retailers, other wholesalers, and industrial users. Some wholesalers buy goods directly from farmers and ship products forward to other wholesalers, while others operate in large urban centers and offer a variety of services,

such as writing orders and matching buyers and sellers, in addition to the physical handling of goods.

Other firms or organizations play a less obvious, though equally important, role in marketing food and fiber products. Brokers, for instance, do not take title to the products they handle, but sell services on commission. They sell market knowledge or bargain on behalf of buyers or sellers. Speculators take title to products and absorb risks associated with price movements. Organized commodity exchanges, such as the Chicago Board of Trade (CBOT), provide facilities and services for futures trading. The CBOT's members include merchants, processors, and brokers.

Marketing intelligence helps ensure efficient marketing by providing buyers and sellers with information to make rational decisions. There are a number of public and private sources of marketing information. The U.S. Department of Agriculture (USDA), for instance, provides a wide range of statistical, economic, and market news reports that contribute to efficient production and marketing decisions. Trade associations, commodity groups, and farm organiza-

tions also gather industry statistics and disseminate market information.

Educational and research organizations ensure a continuing stream of new technologies and educated people to help the marketing system adapt to changes and advances. Government agencies also influence the efficiency and fairness of food marketing. USDA has broad responsibilities related to food and fiber production, export expansion and promotion, credit, conservation, food safety, and domestic and international food assistance. The Food and Drug Administration, an agency of the U.S. Department of Health and Human Services, has the primary responsibility for ensuring the safety and wholesomeness of the processed food supply (except meat and poultry, which are the responsibility of USDA) (18).

Food and Fiber System Adds Income and Employment

Income and employment are generated in the economy as products move through the food and fiber system to domestic and foreign markets. Since every sector buys goods and services from others, the contribution from each sector to GDP can be calculated in terms of the value it adds to the goods and services that it purchases (see box). The value added throughout the economy sums to the total GDP.

Each individual sector of the food and fiber system is interdependent with one or more other sectors for production inputs, transportation, and so forth. For example, the farm input industries, such as tractor manufacturing and fertilizer production, involve not only the manufacturing sector but many other segments of the U.S. economy, including natural resources, marketing, and transportation. The fertilizer industry involves extracting natural resources, operating processing facilities, and moving fertilizer to wholesale and retail distribution points. Similarly, the pesticide production-distribution system includes producers, importers and exporters, independent formulators, wholesale distributors, retail dealers, and custom applicators (7).

The food and fiber system employed almost 23 million people in 1996, or 16.9 percent of the civilian labor force, and contributed almost \$998 billion to the GDP (table 1). While farming is a major source

Measuring the Food and Fiber System

The total food and fiber system includes all economic activities supporting farm production, such as machinery repair, fertilizer production, food processing and manufacturing, transportation, wholesale and retail distribution of products, and eating establishments (6). The fiber system includes all economic activities that link the production of plant and animal fibers and hides to fabric, clothing, and footwear.

Because the food and fiber system is defined as involving all economic activities from the farm to the consumer, input/output analysis provides an appropriate economic procedure to trace the direct and indirect links. The contribution of each component of the system to the gross domestic product is measured in terms of value added, which is, with some minor refinements, the difference between the sale of goods and the purchase of raw materials or services from other sectors.

of income in over 500 rural counties, it furnishes only a small portion of national income and employment. Farm production added 1.6 million jobs to the U.S. economy, including farm proprietors and hired farmworkers. Farmers and their hired workers constituted only 7.2 percent of the people in the food and fiber system in 1996, and the farm sector contributed only 7.1 percent of the total value of the system's products.

Employment in the farm sector has declined for decades in response to the long-term trend toward labor-saving technology. The total hours of labor used for all farmwork is one-fifth that of 1945, as farmers' use of purchased inputs—including high-tech machinery and equipment, fertilizers and pesticides, and crop and harvesting services—increased. Input industries—ranging from farm machinery and pesticides to salt and tin cans—added 4.3 million jobs to domestic employment and \$295.4 billion (30 percent of the food and fiber system's contribution) to GDP in 1996.

Industries that provide financial services, insurance, communications, and other supporting services totaled almost 18 percent of the food and fiber sys-

Table 1—Contribution of the food and fiber system to the U.S. economy, 1996¹

Industry	Value added to GDP	Share of food and fiber system's contribution to GDP	Share of GDP	Number of workers	Share of food and fiber system employment	Share of total U.S. employment
	<i>\$ Billion</i>	<i>----Percent----</i>		<i>Thousands</i>	<i>----Percent----</i>	
Farming	71.3	7.1	0.9	1,637	7.2	1.2
Total inputs:	295.4	29.6	3.9	4,343	19.1	3.2
Mining	13.4	1.3	0.2	60	0.3	—
Forestry, fishing, and agricultural services	8.7	0.9	0.1	315	1.3	0.2
Manufacturing	94.4	9.5	1.2	1,186	5.2	0.9
Services	178.9	17.9	2.3	2,782	12.3	2.1
Total manufacturing and distribution:	631.4	63.3	8.3	16,716	73.7	12.5
Manufacturing--						
Food processing	108.0	10.8	1.4	1,316	5.8	1.0
Textiles	48.2	4.8	0.6	1,352	6.0	1.0
Leather	0.3	—	—	7	—	—
Tobacco	18.4	1.8	0.2	45	0.2	—
Distribution--						
Transportation	33.8	3.4	0.4	602	2.7	0.4
Wholesaling and retailing	283.1	28.4	3.7	6,519	28.7	4.9
Foodservice	139.2	14.0	1.8	6,874	30.3	5.1
Total food and fiber system	997.7	100.0	13.1	22,694	100.0	16.9

— = less than 0.1 percent.

¹ Numbers may not add to totals due to rounding.

Source: Compiled by USDA/ERS from William Edmondson, 1997.

tem's contribution to GDP in 1996, or \$178.9 billion. Construction and repair is the largest industry within the services sector, followed by real estate services, personal and business supply services, legal services, and banking and credit. The credit needs of farming, in particular, have grown over time as producers have increased their degree of specialization and their reliance on purchased inputs. The food industry is one of the most leveraged in the American economy. Total liabilities of food processors and retailers totaled \$318 billion in 1995, up from \$270 billion in 1990 (11).

Food processors accounted for 10.8 percent of the food and fiber system's value added in 1996 and employed 5.8 percent of the system's workers (table 1). Manufacturers of textiles, leather products, and tobacco products added another 6.6 percent of the system's contribution to GDP and employed 6.2 percent of the system's workers.

Transportation of agricultural products accounted for \$33.8 billion of the value added to GDP, while food wholesalers and retailers contributed \$283.1 billion in value added. The growing foodservice industry

rang up \$139.2 billion in 1996, up from \$73.5 billion in 1989.

Food and Fiber System in the Global Economy

The food and fiber system is an interrelated and interdependent part of the global economy. The United States is the world's top exporter of agricultural products, with sales of \$60.4 billion in 1996. Over 30 percent of U.S. crop acreage can be considered as producing for export.

Food and fiber trade is a significant contributor to the U.S. economy. The agricultural trade surplus in 1996 stood at \$26.8 billion as farm exports more than offset \$30 billion of imports. The nonagricultural trade account was in deficit by \$235.1 billion. U.S. agriculture's narrowing of the trade gap helps strengthen the American dollar, which reduces the prices of imported goods and contributes to a lower inflation rate.

USDA's Economic Research Service estimates (see box) that each dollar earned from agricultural exports stimulates another \$1.32 of output in the U.S. econo-

Measuring the Effects of Agricultural Exports

The Economic Research Service used a 524-sector input-output model of the economy to measure the effects of agricultural exports on the Nation's economy, including rural employment (29). The model identifies income and employment (direct and indirect) associated with a particular level of exports, but it does not consider the traditional "multiplier effect" generated in the economy when the income from this employment is spent. Thus, this type of model gives a conservative estimate of the impacts on the economy from agricultural exports.

my (table 2). Thus, the \$60.4 billion worth of exports in 1996 generated an estimated additional \$79.5 billion in supporting activities required to produce and transport products for export.

Approximately 73 percent of this additional economic activity is earned by the nonfarm sector. The food processing sector earned \$6.7 billion from exports. Other manufacturers, including petroleum refiners and tobacco and fertilizer manufacturers, accounted for \$15.5 billion. The value of additional trade and transportation totaled \$9.7 billion. The value of other services, such as utilities, amounted to \$25.6 billion.

U.S. agricultural exports generated 859,000 full-time civilian jobs in 1996. Of these, around 292,000 farmworkers—10 percent of the farm labor force—could have been considered as producing for export. Each billion dollars of 1996 agricultural exports adds about 14,000 jobs to the domestic employment rolls.

The composition of U.S. agricultural exports has changed in the past several decades (20). In the 1960's and 1970's, food grains, feed crops, and oil crops formed the bulk of U.S. agricultural exports. Since the mid-1980's, the value of U.S. high-value exports—such as meat products, fruits and vegetables, and beer and wine (see box)—has increased

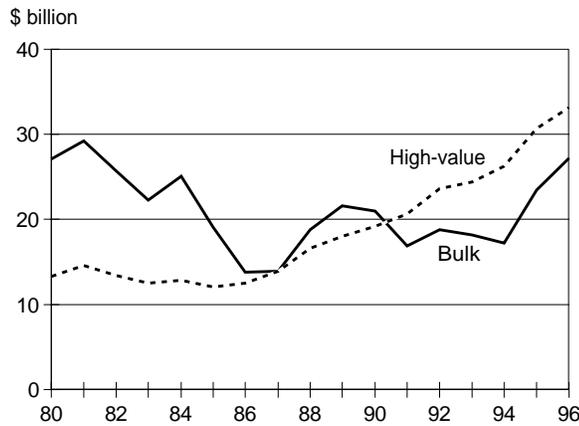
Table 2—U.S. economic activity triggered by agricultural trade

Item	1994	1995	1996		
			Total	Bulk	Other
<i>Billion dollars</i>					
Economic activity generated by agricultural exports	109.5	132.9	139.9	50.3	89.6
Exports	45.7	55.8	60.4	27.2	33.2
Supporting activities	63.8	77.1	79.5	23.1	56.4
Farm	16.9	20.0	21.9	2.7	19.2
Food processing	5.6	6.3	6.7	0.3	6.4
Other manufacturing	14.2	15.5	15.5	5.5	10.0
Trade and transportation	8.3	9.8	9.7	3.0	6.7
Other services	18.8	25.5	25.6	11.6	14.0
<i>Percent</i>					
Nonfarm share	74	74	73	88	67
Multiplier (\$1 of exports generates \$x.xx additional business activity)	1.39	1.38	1.32	.85	1.70
<i>1,000 jobs</i>					
Employment due to exports:					
Total	791	895	859	301	558
Farm	305	333	292	103	189
Nonfarm	485	562	566	197	369
Food processing	78	84	86	1	85
Other manufacturing	71	71	70	21	49
Trade and transportation	178	200	196	81	115
Other services	158	207	214	94	120
Number of jobs per billion dollars of exports	17.3	16.0	14.2	11.1	16.8

Source: (4, 29). 1996 data compiled by USDA/ERS from William Edmondson, 1997.

Figure 3

U.S. high-value and bulk agricultural exports, 1980-96



Source: Compiled by USDA/ERS.

more than 100 percent (fig. 3). The value of high-value exports surpassed unprocessed farm commodities in 1990. In 1996, high-value products accounted for almost 55 percent of U.S. agricultural exports. U.S. exports of high-value foods and beverages totaled \$30.1 billion in 1996.

As the level and product mix of agricultural exports have changed, so have the number and type of related industries involved. Low-value, bulk products generally involve relatively little economic activity outside of agriculture. In contrast, high-value products require more handling and processing beyond the farm gate. USDA estimates that, in 1996, each dollar of high-value exports stimulated another \$1.70 in indirect and supporting activities, compared with \$0.85 from bulk commodities (4).

U.S. agricultural imports grew from \$4 billion in 1959 to \$33.6 billion in 1996. U.S. consumers spent almost \$8.2 billion in 1996 for commodities that cannot be produced profitably in the United States, such as coffee, cocoa, and bananas. While spending for these “noncompetitive” imports has remained fairly constant since the late 1970’s, “competitive” imports—those that compete directly with U.S. production (including meat, dairy products, fruits, nuts, vegetables, sugar, and wine)—more than doubled to \$25.4 billion by 1996.

In some trade categories, the United States offset the value of competitive imports with exports of other

Defining Bulk and High-Value Products

Agricultural products are classified as bulk or high-value. Bulk products include unprocessed grains and oilseeds, raw cotton, and raw tobacco (26).

High-value products can be further classified as unprocessed, semiprocessed, and highly processed. Unprocessed products (including fresh fruit, nuts, and vegetables; honey; breeder livestock; and eggs) and highly processed products (such as dairy products, prepared meats, dried fruits, beverages, beer, and wine) can be consumed with little additional processing. High-value semiprocessed products require further processing and include flour; vegetable oil; oilseed meal; fresh, chilled, and frozen meats; hides and skins; and coffee, cocoa, and sugar.

types of products in the same category. For example, growth in meat exports outpaced the increase in meat imports starting in the 1980’s. Most imported beef comes from low-cost, range-fed animals raised in Australia, Argentina, or Canada and is destined for further processing. U.S. beef exports, in contrast, are largely high-quality, grain-fed cuts.

The United States also exports more oilseeds and oilseed products than it imports. At the same time, large imports of coconut, palm, and palm kernel oils nearly offset U.S. soybean oil exports.

While agricultural trade has increased, foreign ownership and management of domestic companies also has become a more significant part of the globalization of food industries. Although most multinational food and fiber system firms are involved in food processing, foreign investment occurs throughout the food system, including manufactured farm inputs, food distribution and retailing, and foodservice (15).

Food processing firms cite a number of reasons for establishing production facilities in foreign countries rather than exporting from domestic plants. Foreign production avoids most tariff and nontariff trade barriers, while making it easier to deal with local governments and regulatory agencies in the host country. Transportation costs are also lower, which is particularly important for products where consumer packaging adds considerable weight. In addition, foreign

production allows manufacturers to keep abreast of local tastes and opportunities for new product development and reformulations (21).

Some firms prefer to acquire established brands in foreign countries and use those facilities as a base for further expansion. In addition, manufacturing a product in a foreign plant may improve access to local food distribution firms and facilitate marketing and promotion of a branded consumer product. U.S. food manufacturers supply their products to foreign consumers primarily through local production in foreign markets. In 1995, sales of the foreign food manufacturing affiliates of U.S. firms totaled \$113 billion (fig. 4).

Investment by foreign firms implies international exchanges of capital and technology used for food processing, distribution, retailing, foodservice, and other food marketing activities. Both domestic and multinational firms are developing global networks for the ingredients, product formulations, and support services (engineering and plant construction, equipment and packaging systems) necessary to operate.

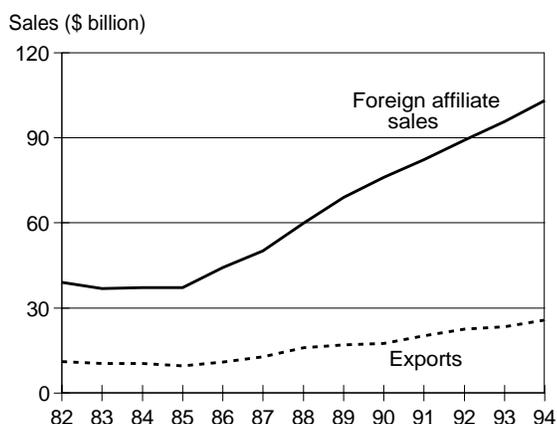
U.S. food and fiber firms operate internationally, shipping products to overseas markets and establishing operations in other countries. At the same time, many major U.S. firms have been acquired by foreign entities.

Food and Fiber Industries Are Important in Rural Economies

The food and fiber system generates employment in both metro and nonmetro areas. Food and fiber industries accounted for a higher share of employment in nonmetro areas than in metro. Of the estimated 24 million workers in nonmetro areas in 1996, 4.8 million (20 percent) worked in the food and fiber system (table 3). Only 17.4 percent, or 18 million out of 102.7 million, were similarly employed in metro areas. Of the 19.7 percent of all nonmetro employment that is linked to the food and fiber system, 3.6 percent originates in the farm sector. This compares with less than 1 percent of the 17 percent of total metro employment in the food and fiber system.

The food and fiber system's share of total nonmetro employment in 1996 ranged from 16.6 percent in the Northeast to 25.1 percent in the Northern Plains (5) (table 4). Food and fiber system farm production and agricultural input industries generated almost 12 percent of total nonmetro employment in the Northern Plains and 7 percent in the Southern Plains, but less than 5 percent in the urbanized Northeast, where most of the nonmetro farm-related jobs were in agricultural wholesale and retail trade. Food processing and textile manufacturing jobs were very important in the Southeast and Appalachia, accounting for 8.9 and 7.3 percent of employment. Textile manufacturing contributed about half of these regions' total food and fiber system manufacturing and distribution jobs.

Figure 4
U.S. processed food exports and sales of U.S.-owned foreign affiliates, 1982-94



1994 is most recent data available for processed food exports.
Source: Compiled by USDA/ERS from (15).

Illustrating the Links

Tracing the events of the 1970's and 1980's, especially the farm crisis of the 1980's, illustrates the links between agriculture and various segments of the economy. Stronger ties to world markets, for example, mean that demand for exports can influence input use—including cropland harvested, capital purchases, and the demand for credit. After declining nearly 16 percent between 1954 and 1969, harvested acreage rose almost 23 percent by 1981 in response to rapid growth in export demand, as well as to higher crop prices and reduced use of Federal crop diversion programs. Farmers and nonfarmers vigorously invested in farmland as a hedge against inflation.

Table 3—Metro and nonmetro U.S. food and fiber system employment, 1996

Food and fiber system (FFS) industry	Employment					
	FFS metro	FFS share of metro	FFS nonmetro	FFS share of nonmetro	Total FFS	Nonmetro share of total FFS
	<i>Million</i>	<i>Percent</i>	<i>Million</i>	<i>Percent</i>	<i>Million</i>	<i>Percent</i>
Total employment ¹	102.7		24.3		127.0	19.1
Food and fiber system	17.9	17.4	4.8	19.7	22.7	21.1
Farm	0.8	0.7	0.9	3.6	1.6	53.5
Total inputs	3.6	3.5	0.7	2.8	4.3	16.1
Mining ²	—	—	—	0.1	0.1	52.2
Forestry, fishing, ag services	0.2	0.2	0.1	0.3	0.3	25.1
Manufacturing	0.9	0.9	0.3	1.1	1.2	24.2
Services	2.5	2.4	0.3	1.2	2.8	10.8
Total manufacturing and distribution	13.5	13.1	3.2	13.3	16.7	19.2
Food processing	1.0	0.9	.4	1.5	1.3	27.6
Textiles	0.8	0.8	.6	2.3	1.4	41.3
Leather	—	—	—	—	—	30.0
Tobacco	—	—	—	—	—	12.4
Transportation	0.5	0.5	0.1	0.3	0.6	13.6
Wholesale and retail trade	5.4	5.3	1.1	4.4	6.5	16.5
Foodservice	5.7	5.6	1.1	4.7	6.9	16.4

¹ Excludes the unemployed which are included in civilian labor force totals of table 1.

² Numbers may not add due to rounding.

— = less than 50,000 jobs.

Source: Compiled by USDA/ERS from William Edmondson, 1997.

Table 4—Share of total nonmetro employment by food and fiber system industry and region, 1996

	U.S.	North-east	Appalachia	South-east	Lake States	Corn Belt	Delta States	Northern Plains	Southern Plains	Mountain	Pacific
<i>Percentage of nonmetro employment</i>											
Total food and fiber industries	19.7	16.6	21.4	23.5	18.1	18.5	19.0	25.1	17.4	18.6	21.0
Farm	3.6	1.7	2.1	2.8	3.6	4.1	2.4	9.2	4.7	3.7	5.2
Total inputs	2.9	3.0	3.1	2.9	2.7	2.8	2.9	2.4	2.4	2.8	3.4
Mining	.1	.1	.2	—	—	.1	.1	.1	.3	.4	—
Forestry, fishing, agricultural services	.3	.3	.3	.3	.2	.2	.3	.2	.3	.3	1.2
Manufacturing	1.2	1.3	1.4	1.3	1.3	1.5	1.4	.8	.7	.5	.8
Services	1.2	1.3	1.1	1.2	1.2	1.1	1.2	1.3	1.2	1.7	1.5
Total manufacturing and distribution	13.3	11.9	16.2	17.8	11.8	11.5	13.7	13.4	10.3	12.1	12.3
Food processing	1.5	1.1	1.2	1.4	1.7	1.6	2.1	2.7	1.4	1.0	1.4
Textiles	2.3	1.2	6.1	7.5	.2	.6	3.2	.3	.7	.1	.1
Leather	—	.1	—	—	—	—	—	—	—	—	—
Tobacco	—	—	.2	—	—	—	—	—	—	—	—
Transportation	.3	.3	.3	.4	.3	.3	.4	.4	.3	.3	.4
Wholesale and retail trade	4.4	4.6	4.3	4.3	4.5	4.3	4.5	4.9	4.1	4.6	4.7
Foodservice	4.7	4.7	4.2	4.2	5.1	4.7	3.6	5.1	3.8	6.0	5.7

— = less than 0.1 percent.

Percentages may not add to total because of rounding.

Source: Compiled by USDA/ERS from William Edmondson, 1997.

Farmers borrowed against rapidly rising equity values to meet cash-flow needs.

The tide turned in the 1980's, however, as export demand weakened and interest rates rose. Foreign production grew in response to the higher prices of the 1970's. Foreign per capita consumption rose at less than two-thirds the pace of the 1970's, due largely to a worldwide recession induced by monetary policy adjustments designed to slow inflation. High real interest rates and the appreciating international value of the U.S. dollar contributed to a debt crisis in developing countries that stifled import demand. Many countries limited or reversed their growing dependence on imports. While world trade stagnated over the first half of the 1980's, U.S. farm exports fared even worse, dropping by a third from the 1981 high.

Farm real estate values fell by more than a third between 1981 and 1986, led by depressed commodity prices, deflated expectations of farmland appreciation, and sudden increases in real interest rates (31). The decline in land values after 1981 left little cushion for debt-burdened farmers, since land accounted for about 70 percent of farm assets. Rising real interest rates increased the cost of borrowing to finance debt, financially squeezing many farmers.

The dramatic swings in the farm economy during the 1970's and 1980's affected many farm-related industries. A booming farm sector in the 1970's encouraged input industries to increase capacity and employment to meet the growing demand for inputs. Employment in the fertilizer industry, for example, grew almost 1 percent annually during 1974-81. As farmers expanded their operations and real interest rates (interest rates less the inflation rate) fell, spending for new and used farm machinery increased 6 percent per year from 1973 to 1979. Sales reached a record \$11.7 billion in 1979. Financing the expansion in production capacity helped triple farm debt between 1970 and 1980.

By the 1980's, input use had declined substantially as agricultural exports, land values, and farm prices fell and surplus stocks rose. Land values declined at the highest rates since the 1930's, and prices received by farmers fell. By 1986, farmland values per acre were down more than a third from the 1981 peak. Acreage idled by farm programs rose from nearly 5 million between 1974 and 1981 to over 38 million in

1982-86. By 1990, Federal programs had idled nearly 60 million acres, with the Conservation Reserve Program accounting for over half of the acreage.

Less land in production meant the demand for production inputs declined sharply. The demand for new farm machinery dropped and farmers kept their tractors and trucks longer. Farm machinery expenditures fell more than 60 percent from 1979 to 1986. Furthermore, more of the tractors, machinery, and equipment purchased were previously owned. Used equipment accounted for over 60 percent of total tractor expenditures in 1986, compared with 40 percent in 1979.

With the sharp drop in demand, input manufacturers were left with large inventories. Capacity utilization in the farm machinery industry dropped from 74 percent in 1974-81 to 41 percent in 1981-85. Fertilizer industry employment declined over 5 percent per year, and the number of employees in the pesticide industries declined more than 3 percent per year. Declining demand, increased imports, and continued shifts of production to other nations meant the farm machinery manufacturing industry lost 45,000 jobs between 1974 and 1985.

The agricultural input industries underwent considerable changes, including extensive corporate reorganizations, mergers, acquisitions, reduced plant capacities, and plant closings. Over the past two decades, the U.S. farm machinery industry, for example, has concentrated on producing large equipment in response to growing domestic, Canadian, and Australian demand. Production of smaller units has shifted to Japan and to European plants of multinational firms (30).

The farm financial crisis of the 1980's also clearly demonstrated the agricultural sector's ties to national fiscal and monetary developments and national financial markets. Lower farm income and land values reduced farmers' capacity to repay record debts. Delinquent farm loans totaled \$23.1 billion in 1986—nearly 15 percent of total loans—compared with 2.5 percent of total farm loans in 1980.

Significant declines in farmland and oil prices—coupled with the deregulation of commercial banks in the 1980's—forced many small banks out of business.

Almost 300 agricultural banks and more than 500 nonagricultural banks failed from 1983 through 1988.

The events of the 1980's resulted in substantial changes in the financial services industry, creating greater competition among farm and nonfarm borrowers for available credit. In addition, shifts occurred in the four major institutional lenders providing credit to the farm sector: commercial banks, the Farm Credit System (FCS), the USDA Farmers Home Administration (FmHA) (now part of USDA's Farm Service Agency), and life insurance companies. Although total farm lending by commercial banks rose less than 2 percent between 1983 and 1990, for example, their share of total farm debt jumped from 24 percent to almost 35 percent. Commercial banks surpassed the FCS as the leading agricultural lender in 1987.

Forces for Change in the Food and Fiber System

While the farm crisis of the 1980's illustrates how specific events can trigger dramatic shifts throughout the food and fiber system, other changes occur more slowly in response to long-term trends. Changing incomes, demographics, lifestyles, and consumer perceptions of health and diet relationships, for example, have created significant changes in the food system over the past several decades.

Technological developments have made many new products possible and redesigned existing products to meet changing consumer demand. Manufacturers, processors, and farmers have changed how farm commodities are purchased, handled, and processed into food. Growth in the foodservice industry here and abroad has prompted changes in service and products. Shifts in public policy regarding agriculture, food programs, and nutritional labeling and advertising have brought other adjustments.

Starting at the far end of the chain from farm to retail, changing consumer demand has significantly altered the types of products and services offered and how they are manufactured and marketed. The growing ethnic diversity of the U.S. population, for instance, has contributed to more numerous market niches like Mediterranean, Thai, and Indian cuisines.

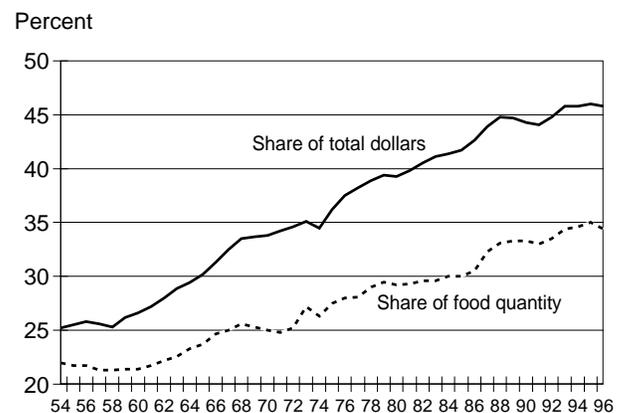
To produce specialized, culture-specific products, firms must often procure specialized farm products (28).

About three-fourths of women ages 25 to 54 are now in the workforce, boosting significantly the number of single- and dual-income households. The share of families with more than one earner rose from 39.1 percent in 1950 to 58 percent in 1990. Convenience has become the key, as consumers now spend an average of 20 to 30 minutes preparing a typical meal (1). With more money and less time, Americans are buying, preparing, and consuming many products that combine more services (such as processing and prepared) with basic foods.

Rising incomes and more two-earner households have also meant Americans eat out more often. Foodservice accounted for 46 percent of all food dollars in 1996, compared with 25 percent in 1954 (fig. 5). Fast-food dining grew the most, with its share of the away-from-home market increasing from 4 percent in 1954 to 33 percent in 1996 (23).

While consumers do not want to spend a lot of time on food preparation, they also are not willing to scrimp on health and nutrition. Concerns about food safety and dietary issues have become important factors affecting consumer food choices. The trend toward lowfat, for example, has contributed to gains in poultry consumption and declines in red meat. Awareness of the potential benefits of fiber has

Figure 5
Away-from-home share of food quantity and food spending, 1954-96



Source: Compiled by USDA/ERS from Alden Manchester, 1997.

helped boost cereal and fresh fruit and vegetable consumption. Consumer concerns about food additives, chemicals, and preservatives have translated into a growing market for products with improved health and safety attributes (2).

Marketers have responded, for example, by introducing pesticide-free products and organic produce. There has also been a growing market for animal-product alternatives, such as vegetarian burgers, soy and rice milk, cheese alternatives, and nondairy desserts—products that did not exist 40 years ago.

The food industry has also actively responded to consumer interest in nutrition by developing and introducing an increasing number of nutritionally improved versions of food. USDA analysis of supermarket scanner data reveal that, between 1989 and 1993, supermarket volume sales of nutritionally improved versions among 37 broad food categories increased 8.5 billion units, compared with an increase of 2.4 billion units for the regular versions of these same food categories (9). These gains translate into a 19.5-percent increase in volume sales for nutritionally improved foods, compared with a 3-percent increase in volume sales for regular versions.

Food processors face new frontiers in food production and in trying to meet consumer, industry, and government demands for safe food products. Irradiation, biotechnology, and genetic engineering are new processes which offer hope, but also raise questions, about how to provide a more varied and safe food supply. Irradiation, for example, has been shown to increase shelf life of fruits and vegetables and reduce microbiological contamination of meats and poultry. However, consumer acceptance has been an issue.

As consumer concerns about food safety have increased, so have the demands that government regulators increase efforts to assure a safe food supply and guarantee consumers better and more accurate information about the characteristics of the food they eat (9). Federal and State agencies are working closely with the food industry to improve the safety of food from farm to table in the food production, processing, distribution, and marketing chain. Broad and long-term science-based strategies are being utilized to prevent foodborne pathogens from entering the food supply and to better protect public health.

Accurate and informative food labeling has become an important issue. In 1994, USDA's Food Safety and Inspection Service (FSIS) issued a rule requiring safe handling instructions on packages of all raw or partially cooked meat and poultry products as part of a comprehensive effort to protect consumers from foodborne illness. FSIS and the Food and Drug Administration (FDA) also issued parallel regulations intended to create uniform nutrition labeling for all foods. Products such as meat, fish, poultry, and produce will increasingly carry chain store or national brand labels to provide quality assurance and accountability.

Environmental awareness has spawned a wave of recyclable, biodegradable, and nonpolluting products. Consumers are increasingly becoming aware of the implications of their purchasing decisions and are demanding "environmentally friendly" products. Manufacturers are using packaging and other environmental characteristics to appeal to consumers in advertising campaigns.

At the same time, the food industry faces the challenge of developing production technologies that help restore and protect the environment. From farm to table, technologies must be adopted which contribute to the sustainability of agriculture and the environment. The net value added to final food products must include an accounting for environmental costs, from air and water pollution, to energy used and heat and garbage created, to recycling considerations (17).

Technological advances also have created new opportunities and products. New product lines and industries, some of which started before World War II but grew in later years, include frozen prepared foods, frozen baked goods, dehydrated vegetables and soups, refrigerated dough, corn sweeteners, processed egg products, and fresh, prepared foods (23).

Fat substitutes, corn sweeteners, and other ingredient substitutes also have redefined many traditional foods, such as sodas and ice cream. Advances in packaging and preserving foods, including aseptic packaging and shelf-stable products, have meant new levels of convenience for consumers.

At the same time, processors have instigated change to create new markets. In the early 1960's, turkey processors set out to create year-round demand

through new, branded products made from turkey meat. Half of all turkeys had been sold in the months of November and December. Processors started by selling turkey parts, such as breasts and legs, but rapidly progressed to turkey rolls, hot dogs, and salami. Similarly, the broiler industry offers branded or unbranded breasts, legs, wings, a complete cut-up bird, a whole bird, and many further-processed products. The types of poultry products have expanded in recent years to meet growing consumer demand for more convenient and low-fat products. Processors have increasingly turned to contracting with growers or vertical integration. Almost all chickens and turkeys are now raised under direct contracts between growers and food companies. The practice is also common in the hog and vegetable industries. Contract production and vertical integration result in constant supplies, particular quality characteristics, and relatively stable raw commodity prices.

Almost all of Arizona's durum wheat is grown under contract with two companies (22). In the Upper Midwest, the pasta industry has combined ownership integration and production contracts to coordinate durum wheat and pasta production. The Dakota Growers Pasta Company, formed by farmers from three Upper Midwest States, owns a modern mill and pasta plant.

Production contracts and ownership integration have increased from 12.7 percent of total farm output in 1960 to 21 percent in 1993-94 (table 5). Such integration is typically between farmers and processors, but also includes that between farmers and input suppliers, such as feed dealers, and between farmers and shippers of fresh products, like vegetables and eggs.

Contracting and vertical integration are the logical outgrowth of consumers' becoming more specific in expressing their food preferences and of the development of technologies that provide significant control over handling, processing, and distribution. Contracting allows food companies more control of production on the farm and specification of the types of commodities that meet consumers' demands. Under vertical integration, this control occurs all within the firm. Contracting also permits the grower to shift some of the price risk and the buyer to remove some of the uncertainties regarding supply (22).

Contracting has also grown as the demand for food-service has increased. Foodservice firms need guaranteed supplies, less variable prices, and specific quality characteristics. The large-scale introduction of salad bars in fast-food and other restaurants, for example, led to contracting for lettuce. It has been available year-round, but price spikes occur every few years due to weather, disease, or insects. Operators with salad bars want guaranteed supplies and have been willing to pay a premium over market prices in normal times to ensure continued supplies and prices when a natural disaster or other disruption occurs.

Growth in the foodservice industry here and abroad has prompted changes in service and products. Reduction of labor has been an important goal in all types of foodservice operations. Streamlined menus have greatly reduced kitchen labor in fast-food establishments, while self-service has meant less need for counter help. In many more conventional restaurants, full service is maintained in the dining room, but the emphasis on reducing labor in the kitchen is nearly as great as in fast-food outlets.

This emphasis on reducing labor has created demand for fabricators—suppliers who provide prepared and semi-prepared foods. Meats are being cut, wrapped and boxed at the packing plant and delivered, ready to cook, to the kitchen. Other operators are providing main courses or complete meals—which require only heating—to airplanes, lunchrooms, and other operations where time and space are limited. The growth of fast-food and other “fixed-menu” restaurants has also meant that the demand for foodservice has become more inelastic—quantities purchased are much less responsive to price changes. Lettuce and poultry provide examples of this phenomenon.

Many of the changes in food processing and marketing have significantly affected the ways in which market prices are formed through the multiple levels of the food system. The relationships among farm, manufacturer, wholesaler, grocery store, and restaurant prices have been altered, and demand relationships are different.

Foodservice price margins are much wider than those for food sold through stores. In 1995, the farm value accounted for 16 percent of the foodservice dollar, compared with 21 percent of the average grocery store food dollar. Thus, restaurant prices tend to be

Table 5—Production contracts and ownership integration

Item	Production contracts ¹		Ownership integration ²		Total	
	1960	1993-94	1960	1993-94	1960	1993-94
	<i>Percent</i>					
Field crops						
Feed grains	.1	1.2	.4	.5	.5	1.7
Food grains	1.0	.1	.3	.5	1.3	.6
Specialty crops						
Vegetables for fresh market	20.0	25.0	25.0	40.0	45.0	65.0
Vegetables for processing	67.0	87.9	8.0	6.0	75.0	93.9
Potatoes	40.0	55.0	30.0	40.0	70.0	95.0
Citrus fruits	0	0	8.9	6.9	8.9	6.9
Other fruits and nuts	0	0	15.0	25.0	15.0	25.0
Sugar beets	99.0	99.0	1.0	1.0	100.0	100.0
Sugar cane	24.4	41.6	75.6	58.4	100.0	100.0
Cotton	5.0	.1	3.0	1.0	8.0	1.1
Tobacco	2.0	9.3	2.0	1.5	4.0	10.8
Livestock						
Fed cattle ³	—	—	6.7	4.5	6.7	4.5
Calves, slaughter ³	—	—	1.5	10.0	1.5	10.0
Sheep and lambs ³	—	—	5.1	29.0	5.1	29.0
Market hogs	.7	10.4	.7	11.4	1.4	21.8
Fluid grade milk	.1	.1	0	0	.1	.1
Manufacturing grade milk	0	0	2.0	1.0	2.0	1.0
Market eggs	7.0	35.0	5.5	60.0	12.5	95.0
Hatching eggs	65.0	70.0	30.0	30.0	95.0	100.0
Broilers	90.0	85.0	5.4	14.0	95.4	99.0
Market turkeys	30.0	56.0	4.0	32.0	34.0	88.0
Total farm output ⁴	8.3	13.1	4.4	7.9	12.7	21.0

— = less than 0.1 percent.

¹ Contracts entered into before production begins. Excludes marketing contracts.

² The same firm owns farms and other vertically related operations, such as a hatchery, feed mill, processing plant, or packer-shipper. Excludes direct marketing to consumers, such as producer-dealers of milk, roadside stands, or pick-your-own operations.

³ Feeding of livestock by the meatpacker, some of which is under contract in feedlots owned by others.

⁴ The percent of total farm output under production contracts and ownership integration includes only the products listed in the tables and is calculated using the same weights in each year so that changes in the share of a commodity, such as broilers, do not affect the figure. The weights are the average share of cash receipts of each product in 1960, 1970, 1980, and 1990.

Source: (22)

substantially more insulated from farm price changes than are foodstore prices.

Restaurant prices have trended upward compared with store prices. But in periods of rapid food price inflation, such as during 1972-74, store prices rise more quickly. Restaurant prices generally tend to rise at about the rate of the Consumer Price Index for nonfood goods and services. This indicates that cost increases for labor and other nonfood items are more important than food costs in determining restaurant prices.

Many restaurants and food processors are offering new or reformulated products in response to con-

sumers' interest in more healthful foods. Three of the largest fast-food chains—McDonald's, Wendy's, and Burger King—switched from cooking with beef tallow to cooking with vegetable oils in 1990 to reduce the saturated fat content of their french fries by about 50 percent. This change increased demand for vegetable oils by 250-300 million pounds per year.

Despite declining demand by the fast-food industry, beef tallow use rose to 1.3 billion pounds in 1994-95, compared with 841 million pounds in 1989-90.

Adjustments in the market for edible tallow included an increase in exports and a diversion from edible to inedible uses, such as displacing a small amount of

tropical oils used in soaps. Exports of edible tallow totaled 277 million pounds in 1994-95, up from 139 million pounds in 1988-89.

Changes throughout the food and fiber system have forced wholesalers to make major adjustments. With the increase in eating out, providing food to foodservice outlets is now more than half the market for wholesalers, and specialization in foodservice wholesaling has become common. Grocery wholesaling has changed from local or regional enterprises to national businesses, serving either foodservice or supermarket clientele. In the 1980's, numerous acquisitions by wholesalers resulted in national chains of wholesalers, such as Fleming and SuperValu.

In addition, the wholesaling industry has seen some vertical integration as grocery wholesalers, such as Consolidated Foods (now Sara Lee), acquired food manufacturing firms. More commonly, however, food manufacturing firms have expanded into wholesaling operations.

A number of large food manufacturers have also acquired both fast-food and full-service restaurants. In particular, many tried to capitalize on the rapid growth of fast-food operations. In 1967, for example, General Foods purchased Burger Chef. Similarly, Pillsbury bought Burger King (Grand Metropolitan, PLC acquired Pillsbury in 1981). The soft drink manufacturer, PepsiCo was the largest restaurant operator in the world until 1997. PepsiCo owned Kentucky Fried Chicken, Taco Bell, Pizza Hut, Hot 'N Now, Cherry's, D'Angelos Sandwich Shops, and East Side Mario's, which have now been spun off as a separate corporation called Tricon.

The growth in away-from-home eating also has contributed to changes in food retailing. Trying to capture some of the foodservice dollar, supermarkets are increasingly offering "ready-to-go" foods at delis and even inhouse eating areas. This trend is part of the expansion of food retailers to large stores characterized by "one-stop shopping." Supermarket formats now include superstores, combination stores, superwarehouse stores, and hypermarkets that stock everything from health and beauty aids to motor oil. The share of superstores more than doubled in the 1980's and early 1990's. The share of food-and-drug combination stores increased fivefold, as did superware-

house stores. The largest single sales segment—conventional supermarkets without a pharmacy and other services—fell from 73 percent of supermarket sales in 1980 to 24.5 percent in 1995 (10).

Warehouse club stores, such as Price Club and Sam's, started in the late 1970's mainly as wholesale outlets selling to small restaurants and institutions. Originally selling only nonperishable foods and non-food groceries, these warehouse club stores have expanded their lines to include some perishables and have broadened their clientele to include individual customers.

While supermarkets are offering more general merchandise, discount department stores like Wal-Mart and K-Mart have expanded into food items. Similarly, some deep-discount drugstores offer a wide variety of food items, with food accounting for 16 percent of sales, compared with 4 percent in other drugstores.

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